

(a) forming an oxidation prevention film on a circuit formation surface of a semiconductor substrate;

(b) forming a trench having a desired depth at a predetermined position of the circuit formation surface of said semiconductor substrate, said trench having an upper end portion adjacent the circuit formation surface of the semiconductor substrate;

(c) oxidizing a trench portion formed in said semiconductor substrate, exposed in said trench;

(d) burying a buried insulating film into said trench so oxidized;

DI (e) after burying said buried insulating film, oxidizing only a portion of said semiconductor substrate, at said upper end portion of the trench, and not substantially at other portions of the semiconductor substrate lining the trench, so as to provide a curvature of the upper end portion of the trench;

(f) removing said buried insulating film formed on said oxidation prevention film;

(g) eliminating said oxidation prevention film formed on said semiconductor substrate; and

(h) after said eliminating, forming a gate oxide film.

2. (Thrice Amended) A method of fabricating a semiconductor device

comprising the steps of:

(a) forming an oxidation prevention film on a circuit formation surface of a semiconductor substrate;

(b) forming shallow trenches having a radius of ^{2nd} curvature at corners in a desired position of the circuit formation surface of said semiconductor substrate;

(c) forming trenches having a predetermined depth to said shallow trenches having a radius of curvature so formed;

(d) oxidizing trench portions formed in said semiconductor substrate, exposed in said trenches;

(e) burying a buried insulating film into said trenches so oxidized;

(f) oxidizing only a portion of the semiconductor substrate extending from said corners, and not substantially at other portions of the semiconductor substrate lining the trenches, after burying said buried insulating film, so as to increase the radius of curvature of the shallow trenches;

(g) removing said buried insulating film formed on said oxidation prevention film;

(h) eliminating said oxidation prevention film formed on said semiconductor substrate; and

(i) after said eliminating, forming a gate oxide film.

3. (Amended) A method of fabricating a semiconductor device according to claim 2, wherein said step for forming shallow trenches is carried out by isotropic etching and said step for forming trenches having a predetermined depth is carried out by anisotropic etching.

Sub
Er
DI

4. (Thrice Amended) A method of fabricating a semiconductor device comprising the steps of:

(a) forming an oxidation prevention film on a circuit formation surface of a semiconductor substrate;

(b) forming trenches having a predetermined depth at desired positions of the circuit formation surface of said semiconductor substrate, said trenches having upper end portions not covered by said oxidation prevention film;

(c) oxidizing trench portions formed in said semiconductor substrate, exposed in said trenches;

(d) burying a buried insulating film into said trenches so oxidized;

~~(f) oxidizing only a portion of said semiconductor substrate at said upper end portions of said trenches, and not substantially at other portions of the semiconductor substrate lining the trenches, after said buried insulating film formed on said oxidation prevention film is removed, said upper end portions~~

not covered by said oxidation prevention film being oxidized;

(g) removing said oxidation prevention film formed on the circuit formation surface of said semiconductor substrate; and

(h) after said oxidizing said semiconductor substrate, forming a gate oxide film.

5. (Thrice Amended) A method of fabricating as semiconductor substrate comprising the steps of:

DI (a) forming an oxidation prevention film on a circuit formation surface of a semiconductor substrate;

(b) forming shallow trenches having a radius of curvature at corners in desired positions of the circuit formation surface of said semiconductor substrate;

(c) forming trenches having a predetermined depth in said shallow trenches having a radius of curvature;

(d) oxidizing trench portions formed in said semiconductor substrate, exposed in said trenches;

(e) burying a buried insulation film into said trenches so oxidized;

(f) removing said buried insulating film formed on said oxidation prevention film;

(g) oxidizing only a portion of said semiconductor substrate extending from said corners, and not substantially at other portions of the semiconductor substrate lining the trenches, after said buried insulating film formed on said oxidation prevention film is removed, so as to increase the radius of curvature of the shallow trenches at said corners;

(h) removing said oxidation prevention film formed on the circuit formation surface of said semiconductor substrate; and

(i) after said oxidizing said semiconductor substrate, forming a gate oxide film.

6. (Amended) A method of fabricating a semiconductor device according to claim 5, wherein said step for forming shallow trenches is carried out by isotropic etching and said step for forming trenches having a predetermined depth is carried out by anisotropic etching.

9. (Thrice Amended) A method of fabricating a semiconductor device comprising the steps of:

(a) forming an oxidation prevention film on a circuit formation surface of a semiconductor substrate,

(b) forming trench regions in said substrate from said circuit formation

surface thereof,

(c) performing a first oxidation to form an oxide film on said trench regions formed in step (b), and

(d) forming an insulating film inside said oxidized trench regions so as to completely fill them, thereby forming completely filled trench regions,

characterized by further steps of:

(e) performing a second oxidation to selectively oxidize only an opening side of said completely filled trench regions in said substrate; and

(f) after performing the second oxidation, forming a gate oxide film.

10. (Twice Amended) A method of fabricating a semiconductor device comprising the steps of:

(a) forming an oxidation prevention film on a circuit formation surface of a semiconductor substrate;

(b) forming a trench having a desired depth at a predetermined position of the circuit formation surface of said semiconductor substrate, the trench

having an upper end portion thereof extending to the circuit formation surface of the semiconductor substrate;

(c) oxidizing a trench portion formed in said semiconductor substrate, exposed in said trench;

- D3
cont
- (d) burying a buried insulating film into said trench so oxidized;
 - (e) after burying said buried insulating film, oxidizing only a portion of the semiconductor substrate, at the upper end portion of said trench and not substantially at other portions of the semiconductor substrate lining the trench, to provide the upper end portion with a curvature;
 - (f) removing said buried insulating film formed on said oxidation prevention film; and
 - (g) removing said oxidation prevention film formed on the circuit formation surface of said semiconductor substrate.
-

sub
CS

15. (Twice Amended) A method of fabricating a semiconductor device comprising the steps of:

(a) forming an oxidation prevention film on a circuit formation surface of a semiconductor substrate;

D4

(b) forming a trench having a desired depth at a predetermined position of the circuit formation surface of said semiconductor substrate, the trench

having an upper end portion thereof extending to the circuit formation surface of the semiconductor substrate;

(c) oxidizing a trench portion formed in said semiconductor substrate, exposed in said trench, so as to provide the upper end portion of said trench with

a curvature;

- D4
cont
- (d) burying a buried insulating film into said trench so oxidized;
 - (e) removing said buried insulating film formed on said oxidation prevention film, having said buried insulating film in said trench; and
 - (f) removing said oxidation prevention film formed on the circuit formation surface of said circuit substrate.

Please add the following new claims to the application:

Sub E6

D5

--39. A method of fabricating a semiconductor device according to claim 15, wherein, after the step (e) of removing said buried insulating film and before the step (f) of removing said oxidation prevention film, the further step of performing thermal oxidation of the semiconductor substrate only at the upper end portion of the trench, to increase the curvature of the upper end portion of the trench as compared with the curvature provided in step (c).

40. A method of fabricating a semiconductor device according to claim 15, wherein, after the step (e) of removing said buried insulating film and before the step (f) of removing said oxidation prevention film, the further step of selectively oxidizing the semiconductor substrate at the upper end portion of the

trench, to increase the curvature of the upper end portion of the trench as compared with the curvature provided in step (c).

41. A method of fabricating a semiconductor device comprising the steps of:
- (a) forming an oxidation prevention film on a circuit formation surface of a semiconductor substrate;
 - (b) forming a trench having a desired depth at a predetermined position of the circuit formation surface of said semiconductor substrate, said trench having an upper end portion adjacent the circuit formation surface of the semiconductor substrate;
 - (c) oxidizing a trench portion formed in said semiconductor substrate, exposed in said trench, forming a curvature of said upper end portion of said trench;
 - (d) burying a buried insulating film into said trench so oxidized;
 - (e) after burying said buried insulating film, selectively oxidizing said semiconductor substrate at said upper end portion so as to provide an increased curvature of the upper end portion of the trench as compared with the curvature formed in step (c);
 - (f) removing said buried insulating film formed on said oxidation

prevention film;

(g) eliminating said oxidation prevention film formed on said semiconductor substrate; and

(h) after said eliminating, forming a gate oxide film.

42. A method of fabricating a semiconductor device according to claim 41, wherein the step (f) of removing the buried insulating film is performed before the step (e) of selectively oxidizing said semiconductor substrate at said upper end portion, and the step (g) of eliminating said oxidation prevention film is performed after the step (e) of selectively oxidizing said semiconductor substrate at said upper end portion.

Fig 4 D
43.

A method of fabricating a semiconductor device comprising the steps of:

(a) forming an oxidation prevention film on a circuit formation surface of a semiconductor substrate;

(b) forming shallow trenches having a radius of curvature at corners in a desired position of the circuit formation surface of said semiconductor substrate;

(c) forming trenches having a predetermined depth to said shallow

trenches having a radius of curvature so formed;

(d) oxidizing trench portions formed in said semiconductor substrate, exposed in said trenches;

(e) burying a buried insulating film into said trenches so oxidized;

(f) selectively oxidizing the semiconductor substrate after burying said buried insulating film, so as to increase the radius of curvature at the corners of the shallow trenches as compared to the radius of curvature formed in step (b);

(g) removing said buried insulating film formed on said oxidation prevention film;

(h) eliminating said oxidation prevention film formed on said semiconductor substrate; and

(i) after said eliminating, forming a gate oxide film.

44. A method of fabricating a semiconductor device according to claim 43, wherein the step (g) of removing said buried insulating film is performed prior to the step (f) of selectively oxidizing, and the step (h) of eliminating said oxidation prevention film is performed after the step (f) of selectively oxidizing.

45. A method of fabricating a semiconductor device comprising the steps of:

(a) forming an oxidation prevention film on a circuit formation surface of a semiconductor substrate;

(b) forming trenches having a predetermined depth at desired positions of the circuit formation surface of said semiconductor substrate, said trenches having upper end portions not covered by said oxidation prevention film;

(c) oxidizing trench portions formed in said semiconductor substrate, exposed in said trenches, so as to provide a curvature at said upper end portions of the trenches;

DS (d) burying a buried insulating film into said trenches so oxidized;

(f) selectively oxidizing said semiconductor substrate after said buried insulating film formed on said oxidation prevention film is removed, said upper end portions not covered by said oxidation prevention film being oxidized;

(g) removing said oxidation prevention film formed on the circuit formation surface of said semiconductor substrate; and

(h) after said oxidizing said semiconductor substrate, forming a gate oxide film.

46. A method of fabricating a semiconductor device comprising the steps of:

(a) forming an oxidation prevention film on a circuit formation surface

of a semiconductor substrate,

(b) forming trench regions in said substrate from said circuit formation surface thereof,

(c) performing a first oxidation to form an oxide film on said trench regions formed in step (b), so as to provide a curvature at an opening side of the trench regions, and

(d) forming an insulating film inside said oxidized trench regions so as to completely fill them,

characterized by further steps of:

D⁵ (e) performing a selective second oxidation to selectively oxidize the opening side of said completely filled trench regions in said substrate, so as to provide an increased curvature at the opening side as compared to said curvature provided in step (c); and

(f) after performing the second oxidation, forming a gate oxide film.

47. A method of fabricating a semiconductor device comprising the steps of:

(a) forming an oxidation prevention film on a circuit formation surface of a semiconductor substrate;

(b) forming a trench having a desired depth at a predetermined position

of the circuit formation surface of said semiconductor substrate, the trench having an upper end portion thereof extending to the circuit formation surface of the semiconductor substrate;

(c) oxidizing a trench portion formed in said semiconductor substrate, exposed in said trench, thereby providing the upper end portion of the trench with a radius of curvature;

(d) burying a buried insulating film into said trench so oxidized;

D5 (e) after burying said buried insulating film, providing the upper end portion of said trench with an increased radius of curvature, as compared with the radius of curvature provided in step (c), by selectively oxidizing the upper end portion of the trench;

(f) removing said buried insulating film formed on said oxidation prevention film; and

(g) removing said oxidation prevention film formed on the circuit formation surface of said semiconductor substrate.

48. A method of fabricating a semiconductor device according to claim

47, wherein the step (f) of removing the buried insulating film formed on said oxidation prevention film is performed prior to the step (e) of providing the upper end portion of the trench with an increased radius of curvature, and the

step (g) of removing the oxidation prevention film is performed after the step (e)
of providing the upper end portion of the trench with an increased radius of the
curvature.

DS
card